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A WHEELBARROW-TYPE SPRAYER FOR EXPERIMENTAL PLOTS

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A wheelbarrow-type sprayer utilizing compressed carbon dioxide as a source of pressure has been built by the authors and successfully used in experimental work on small plots of truck crops in the Salt River Valley, Arizona. The apparatus consists of a rubber-tired wheelbarrow with the bed removed. The wheelbarrow is equipped with a spray boom, tank, and carbon dioxide cylinder. A 2 1/2-gallon paint pot that will withstand a pressure of 60 pounds per square inch was used as the spray tank (fig. 1).

Figure 1.--Wheelbarrow sprayer in operation.

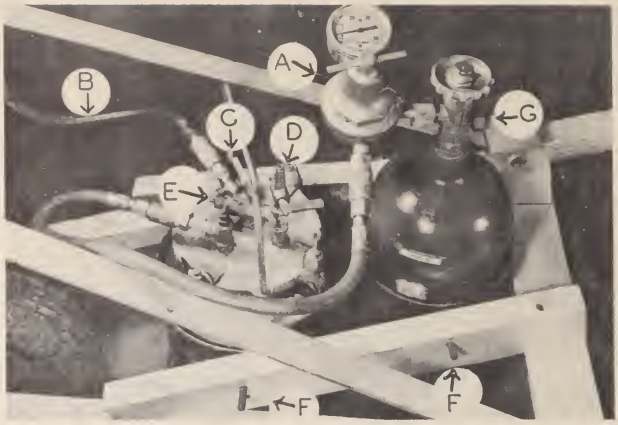

Figure 2.--Close-up showing spray tank and carbon dioxide cylinder. A, Carbon dioxide regulator; B, hose to spray boom; C, stopcock in spray line; D, stopcock for pressure release; E, safety valve for spray tank; F, swivels for strap-iron baskets; G, safety valve for carbon dioxide cylinder.

The spray tank (fig. 2) is connected to the carbon dioxide cylinder through a regulator valve (A) by means of service-station air hose and quick-connector couplings. Similar hose and couplings (B) are used to connect the spray tank to the spray boom. The carbon dioxide gas is released through a pipe at the bottom of the tank, for agitation of the spray material. A similar pipe, fitted with fine-mesh copper screen, provides for the liquid take-off from the bottom of the spray tank. The flow of the liquid spray from the tank is controlled by a stopcock (C) on the lid. Another stopcock (D) releases the pressure from the tank before the lid is removed. A safety valve (E) set for slightly more than 60 pounds per square inch is also mounted on the lid of the tank. Two strap-iron baskets, constructed to hold the carbon dioxide cylinder and the spray tank, are swiveled at the top (F) so that the respective containers will remain upright regardless of the position of the wheelbarrow.

The spray boom is made of 1/2-inch galvanized pipe and fittings. Two 5-foot lengths of pipe are drilled and threaded at 3-inch intervals for 1/4-inch fittings. Brass bushings, 1/4 to 1/8 inch long, are sealed

into the holes and supply the fittings necessary for the shut-off valves with spray nozzles attached. The desired number of nozzles may be placed at selected intervals on the boom, and the unused opening may be closed with 1/8-inch pipe plugs. The two 5-foot lengths of pipe are joined by an offset section consisting of four elbows and four 4-inch nipples (fig. 3). The spray is introduced through a T in the center of the offset.

Figure 3. --Wheelbarrow sprayer with boom folded.

The boom is held in place on the wheelbarrow by U-bolts through holes in strap-iron uprights attached to the wheelbarrow frame. A series of holes makes it possible to adjust the height of the boom. Additional height adjustment can be made by a 180° turn of each of the upper elbows of the offset. The elbows and nipples comprising the offset make it possible to fold back the two 5-foot lengths of pipe bearing the nozzles, as shown in figure 3. This facilitates loading and transporting of the equipment in a pick-up truck.

Wires extending from the center of the boom on each side to the top of the strap-iron boom supports serve to brace the boom. If the boom is used in the highest position, it is necessary to supply a center support for this brace, as shown in figure 1. A 1- by 2-inch piece of wood, extending 12 to 18 inches above the boom, is sufficient for this purpose.

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Liquid carbon dioxide exerts a pressure of approximately 850 pounds per square inch at 70° F. When released through a suitable regulator valve, it was found that 1 pound of liquid carbon dioxide would dispense approximately 10 gallons of spray at 60 pounds pressure.

Caution should be used in the operation of the equipment, since carbon dioxide cylinders equipped with improper safety valves have been known to explode with disastrous results. The safety valve on the carbon dioxide cylinder (G, fig. 2) should be inspected before the cylinder is filled with liquid carbon dioxide. The carbon dioxide cylinder should be kept covered with a damp burlap bag when in contact with direct sunlight to avoid overheating. This precaution reduces the chances of building up too great a pressure and blowing the safety plug.